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CAN/CGSB-3.511-2016

Amendment No. 2 (2018)

Oxygenated automotive gasoline containing ethanol (E1-E10 and E11-E15)

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NATIONAL STANDARD OF CANADA **CAN/CGSB-3.511-2016**

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Oxygenated automotive gasoline containing ethanol (E1-E10 and E11-E15)

CETTE NORME NATIONALE DU CANADA EST DISPONIBLE EN VERSIONS FRANÇAISE ET ANGLAISE.

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Preface

This National Standard of Canada CAN/CGSB-3.511-2016 *Oxygenated Unleaded Automotive Gasoline Containing Ethanol (E1-E10)*, was published in May 2016 and its Amendment No.1 was published in January 2017. This Amendment No. 2 (2018) includes the content of Amendment No. 1 and the following changes:

- Addition of requirements for E11- E15
- Addition of a new Driveability index equation for E11-E15 (Type B)

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Oxygenated automotive gasoline containing ethanol (E1-E10 and E11-E15)

1 Scope

This standard applies to two types of oxygenated gasoline, E1-E10 ("Type A") and E11-E15 ("Type B"), to which no lead or phosphorus compounds have been added, and in which the oxygenate consists essentially of ethanol. They are intended for use in spark-ignition engines under a wide range of climatic conditions. Each type may be supplied in one of four grades which differ in anti-knock index (octane rating).

Type B oxygenated gasoline in this standard is intended for use in automotive vehicles that are approved by manufacturers to be compatible with oxygenated gasoline containing up to 15 % by volume ethanol. The first automotive vehicle manufacturer approval of up to E15 occurred in the 2012 model year. Many types of vehicles, motorcycles, engines, and equipment are not designed for Type B oxygenated gasoline as defined in this standard and use of such fuel blends could result in unsatisfactory or unsafe operation and engine or equipment damage[1].

This standard is not intended to apply to the mixing of oxygenated gasolines and gasolines, either at the point of retail sale or after the point of retail sale.

Some components in fuel distribution systems and on vehicles may not be fully compatible with the two types of oxygenated gasoline as defined in this standard. Users are advised to consult the owner's manual or the equipment manufacturer.

Provincial, territorial and federal regulations control some parameters included in this standard, and when such government regulations are more restrictive, they supersede the requirements in this standard.

The testing and evaluation of a product against this standard may require the use of materials and/or equipment that could be hazardous. This document does not purport to address all the safety aspects associated with its use. Anyone using this standard has the responsibility to consult the appropriate authorities and to establish appropriate health and safety practices in conjunction with any applicable regulatory requirements prior to its use.

2 Normative references

The following normative documents contain provisions that, through reference in this text, constitute provisions of this National Standard of Canada. The referenced documents may be obtained from the sources noted below.

NOTE The addresses provided below were valid at the date of publication of this standard.

An undated reference is to the latest edition or revision of the reference or document in question, unless otherwise specified by the authority applying this standard. A dated reference is to the specified revision or edition of the reference or document in question.

2.1 Canadian General Standards Board (CGSB)

CAN/CGSB-3.0 — *Methods of testing petroleum and associated products*:

No. 14.3 — *Standard test method for the identification of components in automotive gasoline using gas chromatography*

No. 19.5 — *Determination of lead in automotive gasoline (Atomic absorption)*

No. 28.8 — *Visual haze rating of liquid fuels*

[1] http://opei.org/ethanolwarning/

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No. 60.32 — *Standard test method for determination of the corrosiveness to silver of gasoline, middle distillate fuels and oxygenated fuels using silver wool: Rapid ultrasonic method*

CAN/CGSB-3.516 — *Denatured fuel ethanol for use in automotive spark-ignition fuels.*

2.1.1 Source

The above may be obtained from the Canadian General Standards Board, Sales Centre, Gatineau, Canada K1A 1G6. Telephone 819-956-0425 or 1-800-665-2472. Fax 819-956-5740. E-mail ncr.cgsb-ongc@tpsgc-pwgsc.gc.ca. Web site www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html.

It may also be obtained from the Government of Canada Publications, Publishing and Depository Services, Public Services and Procurement Canada, Ottawa, ON, K1A 0S5. Telephone: 1-800-635-7943 or 613-941-5995. Fax 1-800-565-7757 or 613-954-5779. Email publications@tpsgc-pwgsc.gc.ca. Website: http://publications.gc.ca/site/eng/home.html.

2.2 Environment Canada (EC)

Benzene in Gasoline Regulations (SOR/97-493)

Sulphur in Gasoline Regulations (SOR/99-236).

2.2.1 Source

The above may be obtained from the Department of Justice Canada, Communications Branch, 284 Wellington Street, Ottawa, Canada K1A 0H8. Website http://laws-lois.justice.gc.ca/eng/index.html. If this Web site becomes inoperative, regulations may also be found at www.canlii.org.

2.3 Transport Canada (TC)

Transportation of Dangerous Goods (TDG) Regulations.

2.3.1 Source

The above may be obtained from the Department of Justice Canada, Communications Branch, 284 Wellington Street, Ottawa, Canada K1A 0H8. Website http://laws-lois.justice.gc.ca/eng/index.html. If this Web site becomes inoperative, regulations may also be found at www.canlii.org.

2.4 ASTM International

Annual book of ASTM standards (see Annex A).

2.4.1 Source

The above may be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, U.S.A., telephone 610-832-9585, fax 610-832-9555, Website www.astm.org., or from IHS Markit, 200-1331 MacLeod Trail SE, Calgary, Alberta T2G 0K3, telephone 613-237-4250 or 1-800-267-8220, fax 613-237-4251, Website www.global.ihs.com.

2.5 NACE International

TM-0172 — *Determining Corrosive Properties of Cargoes in Petroleum Product Pipelines.*

2.5.1 Source

The above may be obtained from NACE International, 1440 South Creek Drive, Houston, TX 77084-4906, U.S.A. telephone 281-228-6200. Web site www.nace.org. e-mail firstservice@nace.org.

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2.6 United States Environmental Protection Agency (U.S. EPA)

Certified Gasoline Detergents.

2.6.1 Source

The above may be obtained from the U.S. Environmental Protection Agency, Transportation and Air Quality. Web site at http://www3.epa.gov/otaq/fuels1/ffars/web-detrg.htm.

2.7 See Annex B for acts and regulations that apply to oxygenated automotive gasoline containing ethanol.

3 Terms and definitions

For the purposes of this National Standard of Canada, the following terms and definitions apply.

3.1
antiknock index
average of the Research (*RON*) and Motor (*MON*) octane number for the fuel, i.e. (*RON* + *MON*)/2.

3.2
benzene emissions number (BEN)
estimate of the evaporative, running and tailpipe benzene emissions from vehicles and is calculated in accordance with Schedule 1 of the *Benzene in Gasoline Regulations* (see Annex B, B.1.6).

3.3
closed loop side stream sampler
sample line connected to a storage tank or pipeline capable of extracting a sample and re-injecting any excess back into the product being sampled.

3.4
driveability index (DI)
parameter based on distillation temperatures. It is designed to ensure good vehicle performance relating to time-to-start, stalls, hesitations, stumbles, surges and backfiring. It is defined as

$$DI = 1.5 \times T_{10} + 3 \times T_{50} + 1 \times T_{90} + f \times (\%\ volume\ ethanol)$$

where:

T_{10}, T_{50}, T_{90} = temperatures (°C) at 10%, 50%, and 90% evaporated in an ASTM D86 test, see 6.20.

% volume ethanol = Concentration of ethanol in the finished gasoline, in % by volume

% volume ethanol	*f*
1.0-10.	1.33
11	2.12
12	2.90
13	3.69
14	4.47
15	5.26

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DI can be converted to its degrees Fahrenheit equivalent, as follows:

$DI_F = 1.8 \times DI + 176$

where:

DI_F = *DI* based on °F

DI = *DI* based on °C

3.5
grade
oxygenated gasoline as differentiated by the antiknock index, with Grade 1 having the lowest index (see 4.1.2).

3.6
oxygenate
oxygen-containing organic compound, such as an alcohol or ether, which may be used as a fuel or blend component.

3.7
oxygenated gasoline
gasoline conforming to the requirements of this standard.

3.8
phase separation
formation of two layers: a lower aqueous layer and an upper hydrocarbon layer, separated by a common boundary or layer of emulsion.

3.9
point of blending
location where finished gasoline is produced by mixing gasoline with gasoline components. Blending does not include the mixing of finished gasolines or the addition of additives to finished gasoline.

3.10
point of retail sale
location where the end user takes delivery of the product.

3.11
primary supplier
for gasoline that is

a) manufactured in a refinery, the manufacturer;

b) imported, the importer; and

c) blended, the blender.

3.12
primary terminal
distribution facility that

a) is connected directly to a refinery, or

b) can be supplied by pipeline from a refinery, or

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c) receives imported product directly, or

d) is located on the Great Lakes and can be supplied by ship.

3.13
proportional sample
sample made by combining samples from different batches in volumetric proportion.

3.14
recirculation loop
piping and a transfer pump configured into a loop and used to mix the product in a storage tank by recirculating the product from one part of the tank to another.

3.15
sample integrity
no significant change in the detailed requirement being tested, i.e., between the sample point and the analytical equipment.

3.16
type
oxygenate gasoline as differentiated by the percentage by volume ethanol, with Type A having 1.0 % to 10 % by volume and Type B having 11 % to 15 % by volume.

3.17
water tolerance
ability of a gasoline-alcohol blend to dissolve water without phase separation.

3.18
yearly pool average
volume weighted average of a parameter in the gasoline supplied by a primary supplier during a calendar year.

3.19
ethanol
ethyl alcohol, the chemical compound CH_3CH_2OH.

3.20
denatured fuel ethanol
commercially manufactured ethanol containing denaturant, as required by the *Denatured and Specially Denatured Alcohol Regulations* – SOR/2006-103, which makes the ethanol suitable for use in automotive spark-ignition engines and unsuitable for beverage or medicinal use.

4 Classification

4.1 The oxygenated gasoline shall be supplied in the following types and grades, as specified (see 8.1).

4.1.1 Types

Type A — E1-E10

Type B — E11-E15.

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4.1.2 Grades

Grade 1 — Regular

Grade 2 — Mid-grade

Grade 3 — Premium

Grade 4 — Super-premium.

5 General requirements

5.1 The gasoline shall comply with this standard at the point of retail sale except for the volatility requirements specified in 5.2.

5.2 Volatility requirements

The requirements for vapour pressure, distillation, and driveability index are adjusted by geographic zone of intended use and time of year. The zones are described in Table 2 and shown in Figures 1, 2 and 3. The limiting values for each zone are listed in Tables 3A to 3H.

5.3 Vapour pressure

When finished oxygenated gasoline is blended with a component that can increase the vapour pressure of the blend, the vapour pressure limits apply to the blended product at the point of blending.

5.3.1 Vapour pressure, maximum

Maximum vapour pressure limits at or below 72 kPa are solely intended to minimize evaporative losses in fuel distribution and from vehicles and equipment. Vapour pressure limits below 72 kPa in Tables 3A to 3H may be waived by government regulations, but shall not exceed 72 kPa. See Annex B.

5.3.2 Vapour pressure, minimum

Minimum vapour pressure limits are intended to help minimize formation of a flammable mixture in the vapour space of the fuel tanks at low ambient temperatures.

5.4 The volatility requirements specified in 6.18, 6.19 and 6.20 shall be for the period and geographic zone of intended use, detailed in Tables 3A to 3H, with compliance at one of the following:

a) Primary terminal

b) Point of entry into Canada

The volatility schedules detailed in Tables 3A to 3H include a half-month period for turning over inventory at service stations, when necessary. A longer turnover period at times close to seasonal weather changes could result in degraded vehicle performance.

5.5 Oxygenated automotive gasolines containing ethanol may contain additives designed to improve the characteristics of the blend. Additives include but are not limited to metal deactivators, oxidation inhibitors, corrosion inhibitors, icing inhibitors and fuel system detergents. Additives designed and tested to enhance performance shall be added in amounts less than 1.0 % by volume, unless otherwise specified in this standard.

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5.6 Vehicles require effective fuel system detergency to minimize engine deposits that impair performance and increase exhaust emissions.

5.7 Aldehydes, ketones, amines, acids, acid esters, halogenated compounds, silicon compounds, soluble polymers, used lubricating oils and solvents or other such materials shall not be added except as components of additives defined in 5.5 or as normally occurring trace constituents.

5.8 The oxygenated gasoline shall be visually clear and free from undissolved water, sediment and suspended matter under the temperature and conditions of custody transfer. Components shall be thoroughly mixed to prevent the sale of compositions that do not meet the standard or are potentially damaging due to stratification in dispensing tankage.

5.9 Materials used in refinery processes, such as caustics and acids, can be carried over in trace quantities into the gasoline and could cause unexpected problems. Moreover, these contaminants may not be detected by the standard tests listed in this standard. It is recommended that adequate quality assurance procedures be put in place to ensure that any refinery processing materials are identified and controlled.

6 Detailed requirements

6.1 Ethanol

The ethanol component (see 6.15) shall meet the requirements of type 1 or type 2 denatured fuel ethanol in CAN/CGSB-3.516.

6.2 The oxygenated gasoline shall comply with the specified limiting values. The specified limiting values shall not be changed. This precludes any allowances for the test method precision and for adding or subtracting digits.

6.2.1 To determine conformance with the specified limiting values, an observed value or a calculated value shall be rounded off "to the nearest unit" in the last right-hand digit used in expressing the specified limiting value, in accordance with the rounding-off method of ASTM E29. There is one exception (see Table 1, Antiknock index).

6.2.2 Zeroes trailing the last nonzero digit for numbers represented with a decimal point are significant digits, in accordance with ASTM E29.

6.2.3 Where test values differ between two parties, a resolution shall be in accordance with ASTM D3244 in order to determine conformance with the specified limiting values, with the criticality of the limits set at $P = 0.5$.

6.3 Test methods other than those referenced in this standard may be used only if they have been validated in accordance with ASTM D3764 or D6708. Test methods validated by ASTM D4855 prior to 2010 may also be used. These are referred to as validated test methods.

6.3.1 Differences in precision, sensitivity and bias between the referee test methods referenced in the standard and the validated test methods shall be considered.

6.3.2 Validated test methods shall only be used within the bounds of the data covered in their validation.

6.4 In the event of a dispute, the procedures given in 6.2.1, 6.2.2 and 6.2.3 shall be used. If parties in a dispute cannot agree on an analytical method to resolve the dispute, the method listed in the standard shall be used. Where more than one method is listed for a given detailed requirement, the referee method shall be used.

6.5 Differences in precision, sensitivity and bias between the referee test methods and alternate methods listed in the standard shall be considered.

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		Specified limiting values			
		All grades		Test methods	
	Property	Min.	Max.	ASTM	CGSB (except 6.7)
6.6	Copper strip corrosion, 3 h at 50°C	—	No. 1	D130	
6.7	Corrosion, steel in water	—	B+	D7548	NACE TM-0172[a]
6.8	Solvent washed gum content, mg/100 mL	—	5	D381	
6.9	Lead content, mg/L[b]	—	5	D3237 D5059	CAN/CGSB-3.0 No. 19.5[a]
6.10	Manganese content, mg/L	—	18	D3831	
6.11	Oxidation stability,[c] (Induction period) min.	240	—	D525	
6.12	Phosphorus content, mg/L	—	1.3	D3231	
6.13	Sulphur content, mg/kg (see 6.27)	—	80.	D2622 D3120 D5453[a] D7039 D7220	
6.14	Oxygen content % by mass	Report		D4815 D5599 D6729 D6730	CAN/CGSB-3.0 No. 14.3[a]
6.15	Ethanol[d] % by volume Type A Type B	 1.0 11	 10. 15	D4815 D5599 D6729 D6730	CAN/CGSB-3.0 No. 14.3[a]
6.16	Methanol content % by volume	—	0.30	D4815 D5599 D6729 D6730	CAN/CGSB-3.0 No. 14.3[a]
6.17	Antiknock performance	See Table 1		D2699[a] D2700[a] D2885	
6.18	Vapour pressure[e]	See Tables 3A to 3H		D4953 D5191[a] D5482[f] D6378[g]	

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	Property	Specified limiting values			
		All grades		Test methods	
		Min.	Max.	ASTM	CGSB (except 6.7)
6.19	Driveability index	See Tables 3A to 3H		See 3.4	
6.20	Distillation	See Tables 3A to 3H		D86[a and h] D7345[i]	
6.20.1	Final boiling point, °C	—	225	D86[a and h] D7345[i]	
6.21	Appearance at 20 to 25°C, visual haze rating	—	1	—	CAN/CGSB-3.0 No. 28.8
6.22	Benzene content[j], % by volume (see 6.26)	—	1.5	D6729	CAN/CGSB-3.0 No. 14.3[a]
6.23	BEN (see 6.26)[j]	Report		—	
6.24	Silver corrosion (see 9.2), Silver wool, or	—	No. B	—	CAN/CGSB-3.0 No. 60.32[a]
	Silver strip		No. 1	D7671	—

[a] The referee method(s) to be used in the event of a dispute.

[b] The test methods identified were primarily developed for the determination of lead from alkyl lead addition. Caution is advised in the application of this method when determining lead contamination, which is suspected to originate from non-alkyl lead sources.

[c] Oxidation stability can degrade over time. Suppliers should make appropriate allowances in order that this detailed requirement is met at point of sale.

[d] Metered (measured) volumes may be used for reporting in place of analytical tests.

[e] Vapour pressures determined using ASTM D5191 are required to be converted to dry vapour pressure equivalents, to determine compliance with the limits given in this standard.

[f] The precision and bias statement developed for ASTM D5482 did not include fuels above 83 kPa. Users are cautioned to develop their own supporting data to establish correlation with the referee method when this method is used to test such fuels.

[g] This test method showed a bias versus ASTM D5191 (the referee test method).

[h] The ASTM Test Method D86 utilises either manual or automated equipment. In cases of dispute, the automated test method shall be selected as the referee test method.

[i] This test method showed relative bias for some results versus the automated D86 (the referee test method).

[j] In this standard, benzene content and BEN requirements shall conform to the *Benzene in Gasoline Regulations*, Schedule 1 (Annex B, B.1.6).

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6.25 Deposit control additive

All gasoline retailed in Canada shall contain a deposit control additive sufficient to meet either:

a) an intake valve deposit requirement of less than 100 mg average deposit mass per valve after a 16 093.0 km (10 000 mile) driving cycle, or less than 25 mg average deposit mass per valve after a 8046.5 km (5000 mile) driving cycle as specified by ASTM D5500, or

b) an intake valve deposit requirement of less than 135 mg average deposit mass per valve after a 100 h dynamometer test cycle as specified by ASTM D6201.

6.25.1 The addition of a deposit control additive, sometimes referred to as a detergent package, is required to comply with 6.25. Proof of performance shall be provided by:

a) Certification by the deposit control additive supplier that the dosage recommended to the gasoline marketer/ producer meets or exceeds the minimum as listed with the U.S. EPA, or

b) Certification by the marketer/producer that the gasoline meets the intake valve deposit limits given in 6.25 for the ASTM D5500 test, or

c) Certification by the marketer/producer that the gasoline meets the intake valve deposit limits given in 6.25 for the ASTM D6201 test

In any case, the marketer/producer shall maintain records of volumes of gasoline and additives, to show that the gasoline does contain the amount of additive stated.

6.26 Benzene and BEN (benzene emissions number) are controlled by the federal *Benzene in Gasoline Regulations* (see Annex B, B.1.6). In accordance with the regulation, the maximum benzene content allowed for any batch of complying gasoline is 1.5% by volume; this applies to primary suppliers (manufacturers, importers and blenders) who elect to produce gasoline to an annual pool average of 0.95%. The regulation also permits primary suppliers to elect a 1.0% by volume flat limit without any associated yearly pool average. A number of options exist for the BEN limit, for details consult the *Benzene in Gasoline Regulations*.

6.27 Sulphur is controlled by the Federal *Sulphur in Gasoline Regulations* (see Annex B, B.1.7). In accordance with the regulations, the maximum sulphur content allowed for any batch of complying low-sulphur gasoline is 80 mg/kg. Primary suppliers (refiners, blenders or importers) may elect to meet an annual pool average. The regulation also permits primary suppliers to elect a flat limit without any associated yearly pool average. Effective January 1, 2017 the annual pool average dropped to 10 mg/kg. The flat limit dropped to 14 mg/kg from January 1, 2017 to December 31, 2019, then drops to 12 mg/kg starting January 1, 2020. A temporary sulphur compliance unit trading system is in effect from January 1, 2017 until December 31, 2019.

7 Inspection

7.1 Sampling

Sampling equipment and procedures shall be designed and used to obtain representative samples of the product. Sampling lines, hose volumes, etc. should be flushed prior to taking a sample. Sampling containers shall be appropriate for preserving the integrity of the sample for the detailed requirement being determined, and are described in ASTM D5842 and D5854. Sampling procedures recommended in ASTM D4057, D4177, D5842 and D5854 are acceptable but may not be applicable to all situations. Alternative procedures, which may be more appropriate, are described in 7.1.2, 7.1.3 and 7.1.4.

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7.1.1 Sample volume shall be consistent with the requirements of the testing laboratory and/or the authority having jurisdiction. Unless otherwise specified (see 8.1), a sample of at least 3 L shall be collected.

7.1.2 Storage tanks

7.1.2.1 Closed loop side stream samplers designed to minimize volatile light-end losses during sampling may be used. The sample shall be transferred to the container using the procedures described in ASTM D5842. If the temperature of either the sample or container is above the initial boiling point of the product, precooling of the sample is required.

7.1.2.2 Samples may be taken from tank recirculation loops, provided that the recirculation time and intensity is sufficient to effect complete mixing of the product in the tank. The sampling probe and sample transfer shall be consistent with the requirements in ASTM D5842.

7.1.3 On-line analyses

The sampling system used for ASTM D2885 may also be used for other on-line analyses. Results may be obtained either as volumetric weighted averages of multiple determinations or as single determinations on proportional samples. The sampling system shall be connected to the on-line analyzer in a manner that ensures sample integrity is maintained.

7.1.4 Retail dispensers

Samples taken from retail dispensers shall be taken as described in ASTM D5842[2] to minimize splashing and vapour loss. The hose shall be flushed immediately prior to taking a sample. A minimum flushing volume of 4 L is required to ensure a representative sample is obtained from all types of dispensers.

7.1.5 Samples for visual inspection are prone to failure due to contamination from rain, snow and dust, or from sediment in sampling lines or equipment. If contamination is detected, a subsequent sample shall be taken to ensure that the contamination is not due to the sampling system.

7.1.6 To determine sampling equipment and procedure requirements, refer to local regulations. To determine sample transport requirements, refer to the *Transportation of Dangerous Goods (TDG) Regulations* (see Annex B, B.1.4).

8 Options

8.1 The following options shall be specified in the application of this standard:

a) Type (see 4.1.1 and 6.15)

b) Grade (see 4.1.2 and Table 1)

c) Volatility requirements (Tables 3A to 3H)

d) Sample size, if other than as specified (see 7.1.1).

[2] Ensure that the sample container material is appropriate for the type of analysis to be performed. Guidelines for sample containers are given in ASTM D5842 and D5854.

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9 Precautions

9.1 Incorporating additives

The user is cautioned against incorporating other additives in the gasoline unless detailed test data are first obtained, confirming that performance is improved without harmful side effects.

9.2 Fuel level sending units

Premature failures of some silver alloy fuel level sending units can relate to reactive sulphur species in gasoline.

9.3 Filtration

It is recommended that all fuel dispensers be equipped with filters of 10 µm or less nominal pore size at point of retail sale to the customer.

9.4 Water tolerance

Blends of gasoline and ethanol can dissolve a significant amount of water under normal conditions, depending on the amount of ethanol used, the specific hydrocarbons present, and the temperature of the blend. Exposure to water can occur during off-loading into a storage facility tank or over time as the oxygenated gasoline is exposed to moisture in air. When blends are exposed to a greater amount of water than they can dissolve, they separate into two phases or layers. Blends containing ethanol are generally hygroscopic and can, with time, absorb sufficient moisture from the ambient air to cause separation. Separation can be avoided if fuels are sufficiently water-free initially and care is taken during distribution and use to prevent contact with water. An appearance test such as CAN/CGSB-3.0 No. 28.8 may be used to assess susceptibility to phase separation by performing the test at the temperature to which the blended fuel will be exposed.

9.5 Polymeric contamination

Abnormally high unwashed gums (see ASTM D381), measured prior to the addition of deposit control additives, can provide an indication of contamination by polymeric materials.

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Figure 1 — Map of geographic zones — Canada overview

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Figure 2 — Map of geographic zones — Western Canada

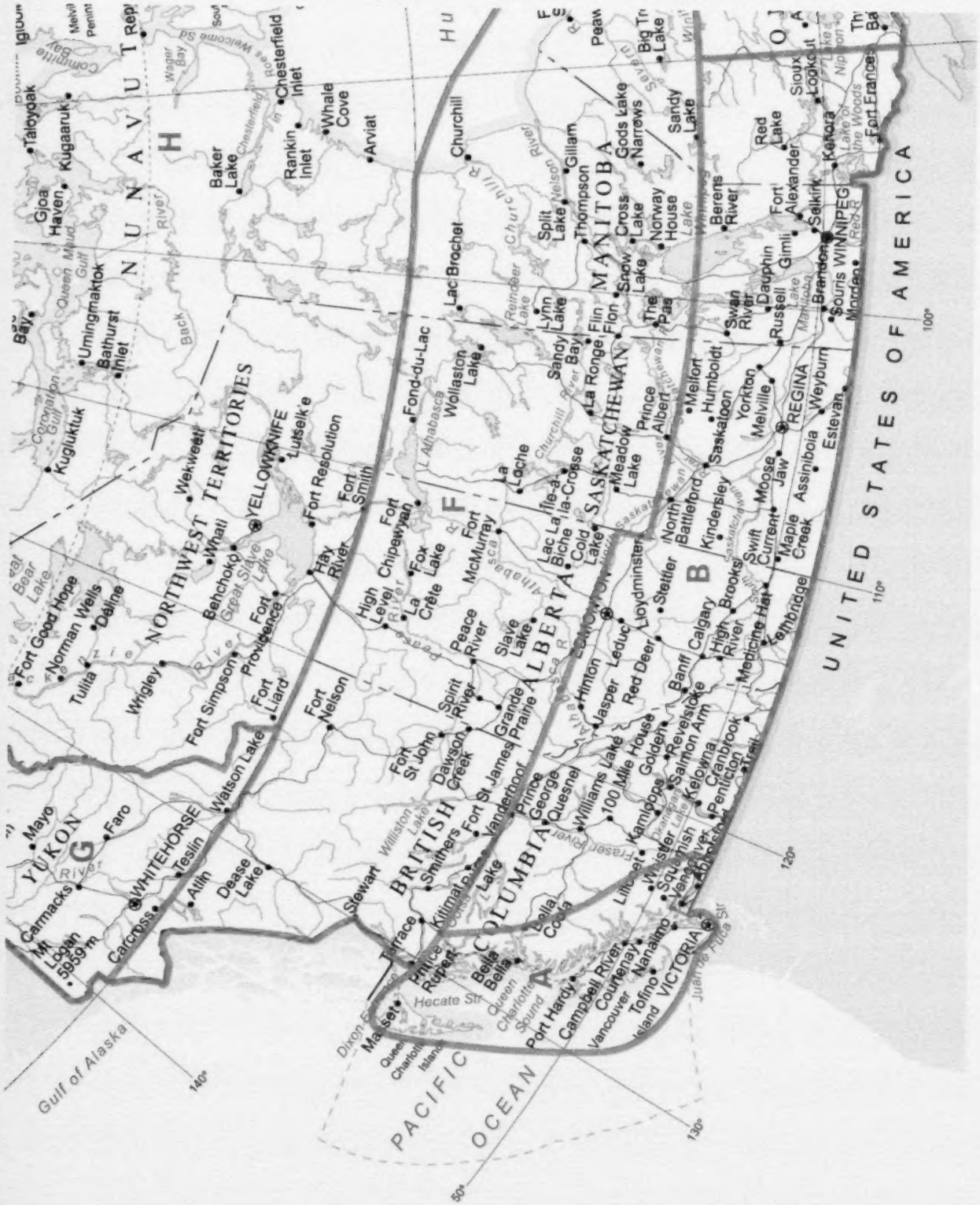

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Figure 3 — Map of geographic zones — Eastern Canada

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Table 1 — Gasoline antiknock performance

Grade	Antiknock index[a] (*RON* + *MON*)/2 Min.	Motor octane number (MON) Min.
Grade 1 — Regular	87.0	82.0
Grade 2 — Mid-grade	89.0	—
Grade 3 — Premium	91.0	—
Grade 4 — Super-premium	93.0	—

[a] The antiknock index shall be reported to the nearest 0.1 unit at point of manufacture or point of import and to the nearest 0.5 unit at the point of sale using the rounding method described in ASTM E29 (see 6.2.1)

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Table 2 — Geographic zone definitions

Zone	Short description	Definition[a]
A	Coastal British Columbia	All the islands off the coast of British Columbia, the Lower Fraser Valley (LFV)[b] and that portion of the mainland within a nominal 100 km of the west coast of British Columbia between latitudes 49° 30′ North and 54° North[c]
B	South Western Canada	The portions of Ontario west of 90° West longitude and south of latitude 53° North, Manitoba south of latitude 53° North, Saskatchewan south of latitude 53° North, Alberta south of latitude 54° North, British Columbia south of latitude 54° North excluding Zone A (Coastal British Columbia).
C	Northern Ontario and Central Quebec	The portions of Ontario north of latitude 46° North, south of latitude 53° North and east of 90° West longitude and Quebec north of latitude 46° North and south of latitude 51° North.
D	Southern Ontario and Southern Quebec	The portions of Ontario and Quebec south of latitude 46° North, including the Seaway Corridor Sub Zone (SCSZ)[d]
E	Atlantic Canada	The island of Newfoundland, the provinces of New Brunswick, Nova Scotia and Prince Edward Island and les Îles de la Madeleine.
F	Northern Canada	The portions of British Columbia and Alberta north of latitude 54° North, Saskatchewan, Manitoba and Ontario north of latitude 53° North; Quebec between latitudes 51° North and 55° North; and Labrador south of latitude 55° North.
G	Yukon	The Territory of the Yukon.
H	Arctic Canada	All of the Northwest Territories, Nunavut and the portions of Quebec (Nunavik) and Labrador north of latitude 55° North.

[a] See Figures 1, 2 and 3 for the approximate locations of the Geographic zones.

[b] The Lower Fraser Valley sub-zone means that part of British Columbia bounded on the north by latitude 49°30', on the west by longitude 123°20', and on the east by longitude 121°15'. It is defined in the BC *Cleaner Gasoline Regulation* (see Annex B, B.2.2.1).

[c] Zone A includes the towns of Whistler and Pemberton. The town of Bella Coola may be supplied with either Zone A or Zone B quality.

[d] The Seaway Corridor Sub-Zone (SCSZ) is defined in two parts:

1) That part of Ontario that lies south of a straight line passing through Arnprior and Grand Bend. Where the line so described runs across a local municipality, the entire local municipality is part of the sub-zone. This is defined by the *Ontario Regulation* (see Annex B, B.2.7.1).

2) That part of Southwestern Quebec defined in the Québec *Petroleum Products Act* (see Annex B, B.2.9.1) as "The Outaouais-Montréal Corridor". See Annex C for the municipalities in the Outaouais-Montréal Corridor.

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Table 3A — Volatility requirements for Zone A (Coastal British Columbia)

Zone volatility limits		Coastal British Columbia All the islands off the coast of British Columbia, the Lower Fraser Valley (LFV)[a] and that portion of the mainland within a nominal 100 km of the west coast of British Columbia between latitudes 49° 30′ North and 54° North.									
		Vapour Pressure			T10 Evaporation		T50 Evaporation			T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max. (kPa)	Max.[b] (kPa) LFV	Min. (°C)	Max. (°C)	Min. (°C)	Min. (°C) LFV	Max. (°C)	Max. (°C)	Max.[c] (°C)
January	1 - 15	45	110.		—	60.	60.		120.	190.	575
January	16 - 31	45	110.		—	60.	60.		120.	190.	575
February	1 - 15	45	110.		—	60.	60.		120.	190.	575
February	16 - 28 (29)	45	110.		—	60.	60.		120.	190.	575
March	1 - 15	35	110.		—	70.	60.		120.	190.	590.
March	16 - 31	35	110.		—	70.	60.		120.	190.	590.
April	1 - 15	35	110.		—	70.	60.		120.	190.	590.
April	16 - 30	35	97	72[d]	—	70.	60.	66	120.	190.	590.
May	1 - 15	35	97	72	—	70.	60.	66	120.	190.	590.
May	16 - 31	35	97	72	—	70.	60.	66	120.	190.	590.
June	1 - 15	35	72	62	35	70.	66		120.	190.	590.
June	16 - 30	35	72	62	35	70.	66		120.	190.	590.
July	1 - 15	35	72	62	35	70.	66		120.	190.	590.
July	16 - 31	35	72	55	35	70.	66		120.	190.	590.
August	1 - 15	35	72	55[d]	35	70.	66		120.	190.	590.
August	16 - 31	35	72	62[d]	35	70.	66		120.	190.	590.
September	1 - 15	35	97	72	—	70.	60.	66	120.	190.	590.
September	16 - 30	35	97		—	70.	60.		120.	190.	590.
October	1 - 15	35	110.		—	70.	60.		120.	190.	590.
October	16 - 31	35	110.		—	70.	60.		120.	190.	590.
November	1 - 15	35	110.		—	70.	60.		120.	190.	590.
November	16 - 30	45	110.		—	60.	60.		120.	190.	575
December	1 - 15	45	110.		—	60.	60.		120.	190.	575
December	16 - 31	45	110.		—	60.	60.		120.	190.	575

[a] The Lower Fraser Valley sub-zone means that part of British Columbia bounded on the north by latitude 49°30′, on the west by longitude 123°20′, and on the east by longitude 121°15′. It is defined in the BC *Cleaner Gasoline Regulation* (see Annex B, B.2.2.1).

[b] See 5.3.1.

[c] If the required maximum vapour pressure is less than 72 kPa then the maximum DI shall be 597.

[d] LFV: 72 kPa maximum applies starting April 16, 55 kPa maximum only applies ending August 14, 62 kPa maximum applies starting August 15. From July 16 to August 14, a 7 kPa waiver on maximum Vapour Pressure is allowed for specific ethanol blends under the BC *Cleaner Gasoline Regulation* (See Annex B, B.2.2.1)

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Table 3B — Volatility requirements for Zone B (South Western Canada)

Zone volatility limits		South Western Canada The portions of Ontario west of 90° West longitude and south of latitude 53° North, Manitoba south of latitude 53° North, Saskatchewan south of latitude 53° North, Alberta south of latitude 54° North, British Columbia south of latitude 54° North excluding Zone A (Coastal British Columbia).							
		Vapour pressure		T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max.[a] (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max. (°C)
January	1 - 15	85	110.	—	50.	60.	110.	185	540.
January	16 - 31	85	110.	—	50.	60.	110.	185	540.
February	1 - 15	65	110.	—	50.	60.	110.	185	550.
February	16 - 28 (29)	65	110.	—	50.	60.	110.	185	550.
March	1 - 15	65	110.	—	50.	60.	110.	185	550.
March	16 - 31	50.	110.	—	55	60.	110.	190.	560.
April	1 - 15	45	97	—	60.	60.	120.	190.	575
April	16 - 30	45	97	—	60.	60.	120.	190.	575
May	1 - 15	45	86	—	60.	62	120.	190.	575
May	16 - 31	35	86	—	70.	66	120.	190.	590.
June	1 - 15	35	72	35	70.	66	120.	190.	590.
June	16 - 30	35	72	35	70.	66	120.	190.	590.
July	1 - 15	35	72	35	70.	66	120.	190.	590.
July	16 - 31	35	72	35	70.	66	120.	190.	590.
August	1 - 15	35	72	35	70.	66	120.	190.	590.
August	16 - 31	35	72	35	70.	66	120.	190.	590.
September	1 - 15	35	86[b]	—	70.	62	120.	190.	590.
September	16 - 30	45	86	—	70.	62	120.	190.	590.
October	1 - 15	45	97	—	60.	60.	120.	190.	575
October	16 - 31	45	110.	—	60.	60.	120.	190.	575
November	1 - 15	50.	110.	—	55	60.	110.	185	560.
November	16 - 30	50.	110.	—	55	60.	110.	185	560.
December	1 - 15	65	110.	—	50.	60.	110.	185	550.
December	16 - 31	65	110.	—	50.	60.	110.	185	550.

[a] See 5.3.1

[b] In Ontario the maximum allowable vapour pressure is 72 kPa from September 1 to September 14 as per the Ontario *Volatility Regulation* (see Annex B, B.2.7.1).

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Table 3C — Volatility requirements for Zone C (Northern Ontario and Central Quebec)

Zone volatility limits		Northern Ontario and Central Quebec The portions of Ontario lying north of latitude 46° North, south of latitude 53° North and east of 90° West longitude and Quebec lying north of latitude 46° North and south of latitude 51° North.							
		Vapour pressure		T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max. (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max. (°C)
January	1 - 15	85	110.	—	50.	60.	110.	185	540.
January	16 - 31	85	110.	—	50.	60.	110.	185	540.
February	1 - 15	85	110.	—	50.	60.	110.	185	540.
February	16 - 28 (29)	65	110.	—	50.	60.	110.	185	550.
March	1 - 15	65	110.	—	50.	60.	110.	185	550.
March	16 - 31	50.	110.	—	55	60.	110.	185	560.
April	1 - 15	50.	110.	—	55	60.	110.	185	560.
April	16 - 30	45	97	—	60.	60.	120.	190.	575
May	1 - 15	45	97	—	70.	60.	120.	190.	590.
May	16 - 31	35	86	—	70.	62	120.	190.	590.
June	1 - 15	35	72	35	70.	66	120.	190.	590.
June	16 - 30	35	72	35	70.	66	120.	190.	590.
July	1 - 15	35	72	35	70.	66	120.	190.	590.
July	16 - 31	35	72	35	70.	66	120.	190.	590.
August	1 - 15	35	72	35	70.	66	120.	190.	590.
August	16 - 31	35	72	35	70.	66	120.	190.	590.
September	1 - 15	35	97[a]	—	70.	60.	120.	190.	590.
September	16 - 30	35	110.	—	70.	60.	120.	190.	590.
October	1 - 15	45	110.	—	60.	60.	120.	190.	575
October	16 - 31	45	110.	—	60.	60.	120.	190.	575
November	1 - 15	45	110.	—	60.	60.	110.	190.	575
November	16 - 30	50.	110.	—	55	60.	110.	185	560.
December	1 - 15	65	110.	—	50.	60.	110.	185	550.
December	16 - 31	65	110.	—	50.	60.	110.	185	550.

[a] In Ontario the maximum allowable vapour pressure is 72 kPa from September 1 to September 14 as per the *Ontario Volatility Regulation* (see Annex B, B.2.7.1)

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Table 3D — Volatility requirements for Zone D (Southern Ontario and Southern Quebec)

Zone volatility limits		Southern Ontario and Southern Quebec The portions of Ontario and Quebec south of latitude 46° North, including the Seaway Corridor Sub Zone (SCSZ)[a]								
		Vapour pressure		SCSZ Vapour pressure	T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max. (kPa)	Max.[b] (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max.[c] (°C)
January	1 - 15	65	110.		—	50.	60.	110.	185	550.
January	16 - 31	65	110.		—	50.	60.	110.	185	550.
February	1 - 15	65	110.		—	50.	60.	110.	185	550.
February	16 - 28 (29)	50.	110.		—	55	60.	110.	185	560.
March	1 - 15	50.	110.		—	55	60.	110.	185	560.
March	16 - 31	45	110.		—	60.	60.	120.	190.	575
April	1 - 15	45	97		—	60.	60.	120.	190.	575
April	16 - 30	35	97		—	70.	60.	120.	190.	590.
May	1 - 15	35	86		—	70.	62	120.	190.	590.
May	16 - 31	35	72[d]		35	70.	66	120.	190.	590.
June	1 - 15	35	72	62	35	70.	66	120.	190.	590.
June	16 - 30	35	72	62	35	70.	66	120.	190.	590.
July	1 - 15	35	72	62	35	70.	66	120.	190.	590.
July	16 - 31	35	72	62	35	70.	66	120.	190.	590.
August	1 - 15	35	72	62	35	70.	66	120.	190.	590.
August	16 - 31	35	72	62	35	70.	66	120.	190.	590.
September	1 - 15	35	72[d]		35	70.	66	120.	190.	590.
September	16 - 30	35	97		—	70.	60.	120.	190.	590.
October	1 - 15	45	97		—	70.	60.	120.	190.	575
October	16 - 31	45	110.		—	60.	60.	120.	190.	575
November	1 - 15	45	110.		—	60.	60.	120.	190.	575
November	16 - 30	45	110.		—	60.	60.	120.	190.	575
December	1 - 15	50.	110.		—	55	60.	110.	185	560.
December	16 - 31	50.	110.		—	55	60.	110.	185	560.

[a] The Seaway Corridor Sub-Zone (SCSZ) is defined in two parts.

1) That part of Ontario that lies south of a straight line passing through Arnprior and Grand Bend. Where the line so described runs across a local municipality, the entire local municipality is part of the sub-zone. This is defined by the *Ontario Regulation* (see Annex B, B.2.7.1).

2) That part of Southwestern Quebec defined in the Québec *Petroleum Products Act* (see Annex B, B.2.9.1) as "The Outaouais-Montréal Corridor".

[b] See 5.3.1.

[c] If the required maximum vapour pressure is less than 72 kPa then the maximum DI shall be 597.

[d] In the case of the Ontario portion of the SCSZ, the 62 kPa limit also applies from May 15 to May 31 and from September 1 to September 14; the point of application is defined in the Ontario *Volatility Regulation* (Annex B, B.2.7.1)

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Table 3E — Volatility requirements for Zone E (Atlantic)

Zone volatility limits		Atlantic Canada The island of Newfoundland, the provinces of New Brunswick, Nova Scotia and Prince Edward Island and Les Iles de la Madeleine.											
		Vapour pressure				T10 Evaporation		T50 Evaporation				T90 Evaporation	Driveability index
				Newfoundland					Newfoundland				
Month	Dates	Min. (kPa)	Max. (kPa)	Class 1[a] Max. (kPa)	Class 2[b] Max. (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Class 1[a] Min. (°C)	Class 2[b] Min. (°C)	Max. (°C)	Max. (°C)	Max. (°C)
January	1 - 15	65	110.	107		—	50.	60.			110.	185	550.
January	16 - 31	65	110.	107		—	50.	60.			110.	185	550.
February	1 - 15	65	110.	107		—	50.	60.			110.	185	550.
February	16 - 28 (29)	50.	110.	107		—	55	60.			110.	185	560.
March	1 - 15	50.	110.	107		—	55	60.			110.	185	560.
March	16 - 31	45	110.	107		—	60.	60.			120.	190.	575
April	1 - 15	45	110.	107		—	60.	60.			120.	190.	575
April	16 - 30	35	97	107		—	70.	60.			120.	190.	590.
May	1 - 15	35	97[c]	97		—	70.	60.			120.	190.	590.
May	16 - 31	35	72	97	72	35	70.	66	60.	66	120.	190.	590.
June	1 - 15	35	72	86	72	35	70.	66	62	66	120.	190.	590.
June	16 - 30	35	72	86	72	35	70.	66	62	66	120.	190.	590.
July	1 - 15	35	72	86	72	35	70.	66	62	66	120.	190.	590.
July	16 - 31	35	72	86	72	35	70.	66	62	66	120.	190.	590.
August	1 - 15	35	72	97	72	35	70.	66	62	66	120.	190.	590.
August	16 - 31	35	72	97	72	35	70.	66	62	66	120.	190.	590.
September	1 - 15	35	72	107	72	35	70.	66	60.	66	120.	190.	590.
September	16 - 30	35	97	107	97	—	70.	60.			120.	190.	590.
October	1 - 15	35	110.	107		—	70.	60.			120.	190.	590.
October	16 - 31	45	110.	107		—	60.	60.			120.	190.	575
November	1 - 15	45	110.	107		—	60.	60.			120.	190.	575
November	16 - 30	45	110.	107		—	60.	60.			120.	190.	575
December	1 - 15	50.	110.	107		—	55	60.			110.	185	560.
December	16 - 31	50.	110.	107		—	55	60.			110.	185	560.

[a] Newfoundland Class 1 is that part of the Island on Newfoundland lying north of latitude 49° (see Annex B, B.2.5).

[b] Newfoundland Class 2 is that part of the Island on Newfoundland lying south of latitude 49° (see Annex B, B.2.5).

[c] In Nova Scotia and New Brunswick the 72 kPa maximum is required at Terminals starting May 15 (see Annex B, B.2.4 and B.2.6).

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Table 3F — Volatility requirements for Zone F (Northern Canada)

Zone volatility limits		Northern Canada The portions of British Columbia and Alberta north of latitude 54° North; Saskatchewan, Manitoba and Ontario north of latitude 53° North; Quebec lying between latitudes 51° North and 55° North; and Labrador south of latitude 55° North.							
		Vapour pressure		T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max.[a] (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max. (°C)
January	1 - 15	85	110.	—	50.	60.	110.	185	540.
January	16 - 31	85	110.	—	50.	60.	110.	185	540.
February	1 - 15	85	110.	—	50.	60.	110.	185	540.
February	16 - 28 (29)	85	110.	—	50.	60.	110.	185	540.
March	1 - 15	65	110.	—	50.	60.	110.	185	550.
March	16 - 31	65	110.	—	50.	60.	110.	185	550.
April	1 - 15	50.	110.	—	55	60.	110.	185	560.
April	16 - 30	50.	97	—	55	60.	110.	185	560.
May	1 - 15	45	97	—	60.	60.	120.	190.	575
May	16 - 31	45	97	—	60.	60.	120.	190.	575
June	1 - 15	35	97	—	70.	60.	120.	190.	590.
June	16 - 30	35	86	—	70.	62	120.	190.	590.
July	1 - 15	35	86	—	70.	62	120.	190.	590.
July	16 - 31	35	86	—	70.	62	120.	190.	590.
August	1 - 15	35	86	—	70.	62	120.	190.	590.
August	16 - 31	35	86	—	70.	62	120.	190.	590.
September	1 - 15	35	97[b]	—	70.	60.	120.	190.	590.
September	16 - 30	45	97	—	70.	60.	120.	190.	575
October	1 - 15	45	110.	—	60.	60.	120.	190.	575
October	16 - 31	45	110.	—	60.	60.	120.	190.	575
November	1 - 15	50.	110.	—	55	60.	110.	185	560.
November	16 - 30	65	110.	—	55	60.	110.	185	550.
December	1 - 15	85	110.	—	50.	60.	110.	185	540.
December	16 - 31	85	110.	—	50.	60.	110.	185	540.

[a] Labrador is additionally subject to the Newfoundland Class 1 vapour pressure maximum requirements as shown in Table 3E (See Annex B, B.2.5.1).

[b] In Ontario the maximum allowable vapour pressure is 72 kPa from September 1 to September 14 as per the *Ontario Volatility Regulation* (see Annex B, B.2.7.1)

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Table 3G — Volatility requirements for Zone G (Yukon)

Zone volatility limits		Yukon The Territory of the Yukon							
		Vapour pressure		T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max. (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max. (°C)
January	1 - 15	85	110.	—	50.	60.	110.	185	540.
January	16 - 31	85	110.	—	50.	60.	110.	185	540.
February	1 - 15	85	110.	—	50.	60.	110.	185	540.
February	16 - 28 (29)	85	110.	—	50.	60.	110.	185	540.
March	1 - 15	65	110.	—	50.	60.	110.	185	540.
March	16 - 31	65	110.	—	50.	60.	110.	185	550.
April	1 - 15	50.	110.	—	50.	60.	110.	185	550.
April	16 - 30	45	110.	—	55	60.	110.	185	560.
May	1 - 15	45	97	—	60.	60.	120.	190.	575
May	16 - 31	35	97	—	70.	60.	120.	190.	590.
June	1 - 15	35	97	—	70.	60.	120.	190.	590.
June	16 - 30	35	86	—	70.	62	120.	190.	590.
July	1 - 15	35	86	—	70.	62	120.	190.	590.
July	16 - 31	35	86	—	70.	62	120.	190.	590.
August	1 - 15	35	86	—	70.	62	120.	190.	590.
August	16 - 31	35	97	—	60.	60.	120.	190.	575
September	1 - 15	35	110.	—	60.	60.	120.	190.	575
September	16 - 30	45	110.	—	60.	60.	120.	190.	575
October	1 - 15	45	110.	—	60.	60.	120.	190.	575
October	16 - 31	50.	110.	—	55	60.	110.	185	560.
November	1 - 15	65	110.	—	50.	60.	110.	185	540.
November	16 - 30	85	110.	—	50.	60.	110.	185	540.
December	1 - 15	85	110.	—	50.	60.	110.	185	540.
December	16 - 31	85	110.	—	50.	60.	110.	185	540.

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Table 3H — Volatility requirements for Zone H (Arctic Canada)

Zone volatility limits[a]		Arctic Canada All of the Northwest Territories, Nunavut, and the portions of Quebec, Nunavik and Labrador[b] north of latitude 55° North.							
		Vapour pressure		T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max.[b] (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max. (°C)
January	1 - 15	85	110.	—	50.	60.	110.	185	540.
January	16 - 31	85	110.	—	50.	60.	110.	185	540.
February	1 - 15	85	110.	—	50.	60.	110.	185	540.
February	16 - 28 (29)	85	110.	—	50.	60.	110.	185	540.
March	1 - 15	85	110.	—	50.	60.	110.	185	540.
March	16 - 31	85	110.	—	50.	60.	110.	185	550.
April	1 - 15	65	110.	—	50.	60.	110.	185	550.
April	16 - 30	50.	97	—	55	60.	110.	185	560.
May	1 - 15	50.	97	—	55	60.	110.	185	560.
May	16 - 31	45	86	—	60.	62	120.	190.	575
June	1 - 15	45	86	—	60.	62	120.	190.	575
June	16 - 30	45	86	—	60.	62	120.	190.	575
July	1 - 15	45	86	—	60.	62	120.	190.	575
July	16 - 31	45	86	—	60.	62	120.	190.	575
August	1 - 15	45	86	—	60.	62	120.	190.	575
August	16 - 31	45	97	—	60.	60.	120.	190.	575
September	1 - 15	50.	97	—	55	60.	110.	185	560.
September	16 - 30	65	110.	—	50.	60.	110.	185	550.
October	1 - 15	65	110.	—	50.	60.	110.	185	550.
October	16 - 31	65	110.	—	50.	60.	110.	185	550.
November	1 - 15	85	110.	—	50.	60.	110.	185	540.
November	16 - 30	85	110.	—	50.	60.	110.	185	540.
December	1 - 15	85	110.	—	50.	60.	110.	185	540.
December	16 - 31	85	110.	—	50.	60.	110.	185	540.

[a] Where fuel is normally delivered in the summer or fall for use during the following winter, the delivered fuel shall meet the volatility requirements for the November 1 to March 31 period. The intent is to ensure cold start and warm-up performance during winter.

[b] Labrador is additionally subject to the Newfoundland Class 1 vapour pressure maximum requirements as shown in Table 3E (See Annex B, B.2.5.1).

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Annex A
(normative)

Referenced ASTM International publications (see 2.4)

Annual Book of ASTM Standards

ASTM D86	Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure
ASTM D130	Standard Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test
ASTM D381	Standard Test Method for Gum Content in Fuels by Jet Evaporation
ASTM D525	Standard Test Method for Oxidation Stability of Gasoline (Induction Period Method)
ASTM D2622	Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry
ASTM D2699	Standard Test Method for Research Octane Number of Spark-Ignition Engine Fuel
ASTM D2700	Standard Test Method for Motor Octane Number of Spark-Ignition Engine Fuel
ASTM D2885	Standard Test Method for Research and Motor Method Octane Ratings Using On-Line Analyzers
ASTM D3120	Standard Test Method for Trace Quantities of Sulfur in Light Liquid Petroleum Hydrocarbons by Oxidative Microcoulometry
ASTM D3231	Standard Test Method for Phosphorus in Gasoline
ASTM D3237	Standard Test Method for Lead in Gasoline by Atomic Absorption Spectroscopy
ASTM D3244	Standard Practice for Utilization of Test Data to Determine Conformance with Specifications
ASTM D3764	Standard Practice for Validation of Process Stream Analyzer Systems
ASTM D3831	Standard Test Method for Manganese in Gasoline by Atomic Absorption Spectroscopy
ASTM D4057	Standard Practice for Manual Sampling of Petroleum and Petroleum Products
ASTM D4177	Standard Practice for Automatic Sampling of Petroleum and Petroleum Products
ASTM D4815	Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C_1 to C_4 Alcohols in Gasoline by Gas Chromatography
ASTM D4855	Standard Practice for Comparing Test Methods
ASTM D4953	Standard Test Method for Vapor Pressure of Gasoline and Gasoline-Oxygenate Blends (Dry Method)
ASTM D5059	Standard Test Method for Lead in Gasoline by X-Ray Spectroscopy
ASTM D5191	Standard Test Method for Vapor Pressure of Petroleum Products (Mini Method)

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ASTM D5453 Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Motor Fuels and Oils by Ultraviolet Fluorescence

ASTM D5482 Standard Test Method for Vapor Pressure of Petroleum Products (Mini Method-Atmospheric)

ASTM D5500 Standard Test Method for Vehicle Evaluation of Unleaded Automotive Spark-Ignition Engine Fuel for Intake Valve Deposit Formation

ASTM D5599 Standard Test Method for Determination of Oxygenates in Gasoline by Gas Chromatography and Oxygen Selective Flame Ionization Detection

ASTM D5842 Standard Practice for Sampling and Handling of Fuels for Volatility Measurement

ASTM D5854 Standard Practice for Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products

ASTM D6201 Standard Test Method for Dynamometer Evaluation of Unleaded Spark-Ignition Engine Fuel for Intake Valve Deposit Formation

ASTM D6378 Standard Test Method for Determination of Vapor Pressure (VP_x) of Petroleum Products, Hydrocarbons, and Hydrocarbon-Oxygenate Mixtures (Triple Expansion Method)

ASTM D6708 Standard Practice for Statistical Assessment and Improvement of Expected Agreement Between Two Test Methods that Purport to Measure the Same Property of a Material

ASTM D6729 Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100-Meter Capillary High Resolution Gas Chromatography

ASTM D6730 Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100-Metre Capillary (with Precolumn) High-Resolution Gas Chromatography

ASTM D7039 Standard Test Method for Sulfur in Gasoline, Diesel Fuel, Jet Fuel, Kerosine, Biodiesel, Biodiesel Blends, and Gasoline-Ethanol Blends by Monochromatic Wavelength Dispersive X-ray Fluorescence Spectrometry

ASTM D7220 Standard Test Method for Sulfur in Automotive, Heating, and Jet Fuels by Monochromatic Energy Dispersive X-ray Fluorescence Spectrometry

ASTM D7345 Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure (Micro Distillation Method)

ASTM D7548 Standard Test Method for Determination of Accelerated Iron Corrosion in Petroleum Products

ASTM D7671 Standard Test Method for Corrosiveness to Silver by Automotive Spark - Ignition Engine Fuel — Silver Strip Method

ASTM E29 Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.

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Annex B
(informative)

Federal, provincial and territorial acts and regulations applicable to automotive gasoline containing ethanol (see 2.2)[3]

B.1 Federal acts and regulation[4]

B.1.1 *Fuels Information Regulations, No. 1* (C.R.C., c.407 as amended by SOR/79-280, 80-138, 2000-105)

These regulations require producers and importers to submit information on sulphur and additive contents (other than lead).

B.1.2 *Gasoline Regulations* (SOR/90-247)

These regulations limit the lead content in unleaded gasoline, restrict leaded gasoline use, and require reporting of lead used in gasoline production. They also limit phosphorus content in gasoline (see 6.9 and 6.12).

B.1.3 *Contaminated Fuel Regulations* (SOR/91-486)

These regulations prohibit the importation of fuels that have been contaminated with hazardous wastes.

B.1.4 *Transportation of Dangerous Goods Regulations* (SOR/2001-286)

These regulations give detailed packaging, labelling and documentation requirements for transporting gasoline samples within Canada.

B.1.5 *Renewable Fuels Regulations* (SOR/2010-189)

These regulations require the use of renewable fuels in Canada.

NOTE These regulations require labelling as a "high renewable fuel" of any gasoline containing over 10 % by volume ethanol. In this standard that would refer to Type B oxygenated gasoline.

B.1.6 *Benzene in Gasoline Regulations* (SOR/97-493)

These regulations establish the limits for benzene and BEN in gasoline and in oxygenates (see 6.22 and 6.23).

B.1.7 *Sulphur in Gasoline Regulations* (SOR/99-236)

These regulations establish the limits for sulphur in gasoline and in oxygenates (see 6.13 and 6.27).

B.2. Provincial and territorial regulations

B.2.1 Alberta

B.2.1.1 Renewable fuel requirements

Renewable fuel requirements are controlled under the *Renewable Fuel Standard Regulation*, Regulation 29/2010

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[3] The regulations listed are subject to revision by the relevant authority. The user should consult the relevant authority to confirm the current regulations. The information provided about the regulations is for information only. In case of conflict, the text of the regulation takes precedence. If any of Web sites referenced becomes inoperative, regulations may also be found at the Web site www.canlii.com.

[4] These regulations may be obtained from the Department of Justice Canada (see 2.2.1).

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B.2.2 British Columbia

B.2.2.1 General requirements and vapour pressure

General requirements and vapour pressure are controlled under the latest version of the *Cleaner Gasoline Regulation* (B.C. Reg. 498/95). [5]

B.2.2.2 ***Renewable and Low Carbon Fuel Requirements Regulation*** (BC Reg. 320/2009)

Requirements for the content of renewable material in fuel and requirements for the reduction of fuel carbon intensity are controlled under the *Renewable and Low Carbon Fuel Requirements Regulation.*

The Regulation specifies that fuel containing more than 10% ethanol shall be labelled in accordance with section 7.3 of the Regulation.

B.2.3 Manitoba

B.2.3.1 General requirements and vapour pressure

General requirements and vapour pressure are controlled under the latest version of the *Dangerous Good Handling and Transportation Act*, including the *Dangerous Good Handling and Transportation Regulation* (55/2003) and the – *Storage and Handling of Petroleum Products and Allied Products Regulation* (188/2001) [6].

B.2.3.2 Ethanol requirements

Ethanol requirements are controlled under the *Ethanol General Regulation, Regulation* 165/2007.

B.2.4 New Brunswick

B.2.4.1 Vapour pressure

Vapour pressure is controlled under the *Clean Air Act* and Regulations — *Air Quality Regulation* (N.B. Reg. 97-133).

B.2.5 Newfoundland and Labrador

B.2.5.1 Vapour pressure

Vapour pressure is controlled under the *Environmental Protection Act* (O.C. 2003-229) — *Gasoline Volatility Control Regulations* (62/03).

B.2.6 Nova Scotia

B.2.6.1 Vapour pressure

Vapour pressure is controlled under the *Environment Act* and Regulations — *Air Quality Regulations* (N.S. Reg. 55/95).

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[5] Available from the British Columbia Ministry of Environment, Lands and Parks, telephone 604-927-2914. Web site at www.elp.gov.bc.ca.

[6] Available from the Government of Manitoba, www.gov.mb.ca/conservation/envprograms/haz-waste/prov-leg/index.html.

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B.2.7 Ontario

B.2.7.1 Vapour pressure

Vapour pressure is controlled under the latest version of *Ontario Regulation 271/91*, as amended by *Ontario Regulation* 45/97.[7]

B.2.7.2 Fuel products

Definitions (as per CGSB standards) listed under the latest revision of the *Technical Standards and Safety Act — Liquid Fuels Handling Code*.

B.2.7.3 Ethanol requirements

Ethanol requirements are controlled under the *Ethanol in Gasoline Ontario Regulation* 535/05.

B.2.8 Prince Edward Island

B.2.8.1 General requirements

General requirements are controlled under the *Petroleum Products Act Regulations* (EC38/91).

B.2.9 Québec

B.2.9.1 General requirements

The general requirements are controlled under the latest version of the *Loi sur les produits pétroliers*, R.S.Q., c. P-30.1, *Règlement sur les produits pétroliers*, D.581-2015, G.O. 28, 2147 *or Petroleum Products Act*, R.S.Q., c. P-30.01, *Petroleum Products Regulation*, O.C. 581-2015, G.O. 28, 1375B[8]. This regulation lists Quebec quality requirements for aviation gasolines, aviation turbine fuels, automotive gasolines, gasolines containing denatured fuel ethanol for use in automotive spark-ignition fuels, diesel fuels, diesel fuels containing biodiesel (B100) for blending in middle distillate fuels, fuel oil types 0, 1 and 2; and fuel oil types 4, 5 and 6. Amendments and editions published apply only 90 days after the last day of the month that the French text of the amendments or editions was published. The Direction générale des hydrocarbures et des biocombustibles of the ministère de l'Énergie et des Ressources naturelles is responsible for the application and revision of this regulation. Web site www.mern.gouv.qc.ca/english/energy/index.jsp.

B.2.10 Saskatchewan

B.2.10.1 Ethanol requirements

Ethanol requirements are controlled under the *Ethanol Fuel (General) Regulations*, 115/2002 as amended.

B.2.11 Yukon

B.2.11.1 General requirements

General requirements are controlled under the *Gasoline Handling Act* and Regulations — *Gasoline Handling Regulations* (O.I. C. 1972/137).

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[7] Available from the Ontario e-Laws Ontario Statutes and Regulations Web site at http://www.e-laws.gov.on.ca

[8] Available from Les Publications du Québec, telephone 1-800-463-2100 or 418-643-5150. Fax 1-800-561-3479 or 418-643-6177. Also available on-line at http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=1&file=102225.pdf.

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Annex C
(normative)

List of municipalities in the Outaouais-Montréal corridor

Municipalities are listed either by regional county municipalities (RCM) or, by administrative region or metropolitan community. The indicated numbers correspond to the codes assigned to each municipality, RCM, administrative region or metropolitan community in the Répertoire des municipalités published by the Ministère des Affaires Municipales, des Régions et de l'Occupation du Territoire.

530 PIERRE DE SAUREL
53085 Saint-Gérard-Majella, P

550 ROUVILLE
55023 Saint-Césaire, V
55030 Sainte-Angèle-de-Monnoir, M
55037 Rougemont, M
55048 Marieville, V
55057 Richelieu, V
55065 Saint-Mathias-sur-Richelieu, M

560 LE HAUT-RICHELIEU
56083 Saint-Jean-sur-Richelieu, V
56097 Mont-Saint-Grégoire, M
56105 Sainte-Brigide-d'Iberville, M

570 LA VALLÉE-DU-RICHELIEU
57005 Chambly, V
57010 Carignan, V
57020 Saint-Basile-le-Grand, V
57025 McMasterville, M
57030 Otterburn Park, V
57033 Saint-Jean-Baptiste, M
57035 Mont-Saint-Hilaire, V
57040 Beloeil, V
57045 Saint-Mathieu-de-Beloeil, M
57050 Saint-Marc-sur-Richelieu, M
57057 Saint-Charles-sur-Richelieu, M
57068 Saint-Denis-sur-Richelieu, M
57075 Saint-Antoine-sur-Richelieu, M

590 MARGUERITE D'YOUVILLE
59010 Sainte-Julie, V
59015 Saint-Amable, M
59020 Varennes, V
59025 Verchères, M
59030 Calixa-Lavallée, P
59035 Contrecoeur, V

600 L'ASSOMPTION
60005 Charlemagne, V
60013 Repentigny, V
60020 Saint-Sulpice, P
60028 L'Assomption, V
60035 L'Épiphanie, V
60040 L'Épiphanie, P

630 MONTCALM
63005 Sainte-Marie-Salomé, P
63013 Saint-Jacques, M
63023 Saint-Alexis, M
63030 Saint-Esprit, M
63035 Saint-Roch-de-l'Achigan, M
63040 Saint-Roch-Ouest, M
63048 Saint-Lin-des-Laurentides, V
63055 Saint-Calixte, M
63060 Sainte-Julienne, M
63065 Saint-Liguori, P

640 LES MOULINS
64008 Terrebonne, V
64015 Mascouche, V

13 OUTSIDE AN RCM / LAVAL
65005 Laval, V

663 OUTSIDE AN RCM / COMMUNAUTÉ MÉTROPOLITAINE DE MONTRÉAL
58007 Brossard, V
58012 Saint-Lambert, V
58033 Boucherville, V
58037 Saint-Bruno-de-Montarville, V
58227 Longueuil, V
66007 Montréal-Est, V
66023 Montréal, V
66032 Westmount, V
66047 Montréal-Ouest, V
66058 Côte-Saint-Luc, V
66062 Hampstead, V
66072 Mont-Royal, V
66087 Dorval, V
66092 L'Île-Dorval, V
66097 Pointe-Claire, V
66102 Kirkland, V
66107 Beaconsfield, V
66112 Baie d'Urfé, V
66117 Sainte-Anne-de-Bellevue, V
66127 Senneville, VL
66135 Sainte-Geneviève, V
66142 Dollard-des-Ormeaux, V

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16 OUTSIDE AN RCM / MONTÉRÉGIE
67802 Kahnawake, R.I.
69802 Akwesasne, R.I.

670 ROUSSILLON
67005 Saint-Mathieu, M
67010 Saint-Philippe, M
67015 La Prairie, V
67020 Candiac, V
67025 Delson, V
67030 Sainte-Catherine, V
67035 Saint-Constant, V
67040 Saint-Isidore, P
67045 Mercier, V
67050 Châteauguay, V
67055 Léry, V

680 LES JARDINS-DE-NAPIERVILLE
68020 Sainte-Clotilde-de-Châteauguay, P
68025 Saint-Patrice-de-Sherrington, P
68040 Saint-Jacques-le-Mineur, P
68045 Saint-Édouard, P
68050 Saint-Michel, P
68055 Saint-Rémi, V

690 LE HAUT-SAINT-LAURENT
69010 Franklin, M
69017 Saint-Chrysostome, M
69025 Howick, VL
69030 Très-Saint-Sacrement, P
69037 Ormstown, M
69045 Hinchinbrooke, CT
69050 Elgin, CT
69055 Huntingdon, V
69060 Godmanchester, CT
69065 Sainte-Barbe, P
69070 Saint-Anicet, P
69075 Dundee, CT

700 BEAUHARNOIS-SALABERRY
70005 Saint-Urbain-Premier, M
70012 Sainte-Martine, M
70022 Beauharnois, V
70030 Saint-Étienne-de-Beauharnois, M
70035 Saint-Louis-de-Gonzague, P
70040 Saint-Stanislas-de-Kostka, P
70052 Salaberry-de-Valleyfield, V

710 VAUDREUIL-SOULANGES
71005 Rivière-Beaudette, M
71015 Saint-Télesphore, P
71020 Saint-Polycarpe, M
71025 Saint-Zotique, VL
71033 Les Coteaux, M
71040 Coteau-du-Lac, M
71045 Saint-Clet, M
71050 Les Cèdres, M
71055 Pointe-des-Cascades, VL
71060 L'Île-Perrot, V
71065 Notre-Dame-de-L'Île-Perrot, V
71070 Pincourt, V
71075 Terrasse-Vaudreuil, M
71083 Vaudreuil-Dorion, V
71090 Vaudreuil-sur-le-Lac, VL
71095 L'Île-Cadieux, V
71100 Hudson, V
71105 Saint-Lazare, V
71110 Sainte-Marthe, M
71115 Sainte-Justine-de-Newton, P
71125 Très-Saint-Rédempteur, P
71133 Rigaud, M
71140 Pointe-Fortune, VL

720 DEUX-MONTAGNES
72005 Saint-Eustache, V
72010 Deux-Montagnes, V
72015 Sainte-Marthe-sur-le-Lac, V
72020 Pointe-Calumet, M
72025 Saint-Joseph-du-Lac, M
72032 Oka, M
72043 Saint-Placide, M

730 THÉRÈSE-DE-BLAINVILLE
73005 Boisbriand, V
73010 Sainte-Thérèse, V
73015 Blainville, V
73020 Rosemère, V
73025 Lorraine, V
73030 Bois-des-Filion, V
73035 Sainte-Anne-des-Plaines, V

15 OUTSIDE AN RCM / LAURENTIDES

74005 Mirabel, V

750 LA RIVIÈRE-DU-NORD
75005 Saint-Colomban, P
75017 Saint-Jérôme, V
75028 Sainte-Sophie, M
75040 Prévost, V
75045 Saint-Hippolyte, P

760 ARGENTEUIL
76008 Saint-André-d'Argenteuil, M
76020 Lachute, V
76025 Gore, CT
76030 Mille-Isles, M
76035 Wentworth, CT
76043 Brownsburg-Chatham, V
76055 Grenville, VL
76052 Grenville-sur-la-Rouge, M
76065 Harrington, CT

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770	**LES PAYS-D'EN-HAUT**
77022	Sainte-Adèle, V
77030	Piedmont, M
77035	Sainte-Anne-des-Lacs, P
77043	Saint-Sauveur, V
77050	Morin-Heights, M
800	**PAPINEAU**
80005	Fassett, M
80010	Montebello, M
80015	Notre-Dame-de-Bon-Secours, M
80020	Notre-Dame-de-la-Paix, M
80027	Saint-André-Avellin, M
80037	Papineauville, M
80045	Plaisance, M
80050	Thurso, V
80055	Lochaber, CT
80060	Lochaber-Partie-Ouest, CT
80065	Mayo, M
80070	Saint-Sixte, M
80078	Ripon, M
80085	Mulgrave-et-Derry, M
07	**OUTSIDE AN RCM / OUTAOUAIS**
81015	Gatineau, V
820	**LES COLLINES-DE-L'OUTAOUAIS**
82005	L'Ange-Gardien, M
82010	Notre-Dame-de-la-Salette, M
82015	Val-des-Monts, M
82020	Cantley, M
82025	Chelsea, M
82030	Pontiac, M
82035	La Pêche, M
840	**PONTIAC**
84005	Bristol, M
84010	Shawville, M
84015	Clarendon, M
84020	Portage-du-Fort, VL
84025	Bryson, M
84030	Campbell's Bay, M
84035	Grand-Calumet, M
84040	Litchfield, M
84045	Thorne, M

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